

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

Claim 1. (currently amended) A process of laser capture microdissection of at least a portion from a specimen having the steps of:

- providing a selectively activatable layer which upon activation becomes adhesive to a portion of the specimen and ~~causes volumetric expansion of the activatable layer~~ with volumetrically expands with the volumetric expansion exceeding a first interval taken normal to a surface of the selectively activatable layer;
- placing the selectively activatable layer overlying the specimen at a finite separation less than the first interval without contacting the specimen;
- selectively activating the selectively activatable layer to cause volumetric expansion at least to the first interval to locally contact a portion of the specimen at the extremity of the volumetric expansion and become adhesive to the portion of the specimen; and,
- separating the selectively activatable layer from the specimen to microdissect the contacted portion of the specimen from the remainder of the specimen after selective activation.

Claim 2. (previously amended) The process of laser capture microdissection from a specimen according to claim 1 having the steps of:

- providing a supporting substrate; and,
- adhering the selectively activatable layer to the supporting substrate.

Claim 3. (previously amended) The process of laser capture microdissection from a specimen according to claim 1 having the steps of:

- before the selectively activating step, visualizing the portion of the specimen to locate the portion of the specimen for microdissection; and,
- activating the selectively activatable layer overlying the visualized portion of the specimen.

Claim 4. (previously amended) The process of laser capture microdissection from a specimen according to claim 1 where the selectively activating step forms a mechanical bond with the specimen.

Claim 5. (currently amended) The process of laser capture microdissection from a specimen according to claim 1 ~~having~~wherein the stepsstep of:

~~the step of providing a selectively activatable layer includes the step of placing a coating on one side of the selectively activatable layer, the coating having an affinity specific bond with the specimen, wherein upon activation, the coated selectively activatable layer can be contacted to the specimen to form affinity specific bonds with the portion of the specimen;~~

~~exposing the selectively activatable layer at the coating to the specimen; and, the selectively activating step includes activating the selectively activatable layer to cause the coating having the affinity specific bond to contact the specimen and form affinity specific bond with the portion of the specimen on the activatable layer.~~

Claim 6. (previously amended) The process of laser capture microdissection from a specimen according to claim 1 having the steps of:

repeating the placing, selectively activating, and separating steps at different portions of the specimen with different parts of the selectively activatable layer to capture a series of portions of the specimen on the selectively activatable layer.

Claim 7. (previously amended) The process of laser capture microdissection from a specimen according to claim 6 having the steps of:

moving the selectively activatable layer with respect to the specimen to microdissect and concentrate the series of portions of the specimen on the selectively activatable layer.

Claim 8. (previously amended) A process of attachment of a selectively activatable layer to a portion of a specimen having the steps of:

providing a selectively activatable layer which upon laser activation causes heat generated volumetric expansion of an extremity to a first interval taken normal to the surface of the selectively activatable layer and upon cooling elastically contracts the extremity towards the activatable layer, the extremity of the volumetric expansion becoming adhesive with respect to a specimen during and after activation;

placing the selectively activatable layer overlying the specimen at a portion for microdissection at a separation less than the first interval without contacting the specimen; and,
selectively activating with laser energy to heat the selectively activatable layer to cause heat generated volumetric expansion of the extremity to a first interval taken normal to the surface of the selectively activatable layer to contact the portion of the specimen and adhere to the portion of the specimen;

ceasing the laser activation; and,

allowing the heated selectively activatable layer to cool and elastically contract the extremity towards the activatable layer while maintaining adherence to the portion of the specimen.

Claim 9. (currently amended) The process of attachment of a selectively activatable layer to a portion of a specimen according to claim 8 having the steps of:

allowing the heated selectively activatable layer to cool and elastically contract the extremity towards the activatable layer while maintaining adherence to the portion of the specimen to ~~thereby~~ microdissect and pull away the portion of the specimen from a remainder of the specimen.

Claim 10. (previously amended) The process of attachment of a selectively activatable layer to a portion of a specimen according to claim 8 having the steps of:

contracting the volumetric expansion by cooling while maintaining attachment to the portion of the specimen to elastically tension the volumetric expansion of the activatable layer; and,

withdrawing the activatable layer from the specimen to separate and thus microdissect the portion of the specimen from the remainder of the specimen.

Claim 11. (previously amended) The process of attachment of a selectively activatable layer to a portion of a specimen according to claim 8 having the steps of:
contracting the volumetric expansion at the extremity to withdraw the portion of the specimen bonded to the volumetric expansion within the first interval whereby the portion of the specimen bonded to the extremity of the volumetric expansion cannot contact underlying and remaining portions of the specimen.

Claim 12. (currently amended) The process of attachment of a selectively activatable layer to a portion of a specimen according to claim 8 wherein the step of selectively activating the activatable layer includes:

providing activatable layer with a phase transition wherein the activatable layer is provided with a volume change associated with phase transistion.

Claim 13. (previously amended) The process of attachment of a selectively activatable layer to a portion of a specimen according to claim 8 having the steps of:
attaching the activatable layer to a supporting substrate.

Claim 14. (currently amended) A process of laser capture microdissection from a specimen having the steps of:

providing a selectively activatable layer which upon activation by laser causes volumetric expansion upon heating beyond a first interval and becomes adhesive ~~with respect~~ to a specimen;

placing the selectively activatable layer overlying the specimen at a separation less than a first interval without contacting the specimen;

heating and expanding the selectively activatable layer to cause volumetric expansion first by locally heating and expanding a first inner volume of the selectively activatable layer with a component of expansion normal to the selectively activatable layer to cause an extremity of expansion away from the activatable layer;

heating and expanding a ~~surrounding~~ second volume of the selectively activatable layer surrounding the first volume with a component of expansion in a plane of the selectively activatable layer into the first volume whereby a total volumetric expansion occurs with the second volume expanding into and extruding the first volume at the extremity for a total expansion at least to the first interval to locally contact a portion of the specimen with the extremity of the volumetric expansion and adhere to the portion of the specimen; and,
removing the extremity of the volumetric expansion with the portion of the specimen attached to microdissect the portion from the sample.

Claim 15. (previously amended) The process of laser capture microdissection from a specimen according to claim 14 having the steps of:

generating a vapor bubble in the first volume during heating and expanding of the first volume whereby the vapor bubble contributes to the volumetric expansion of the first volume.

Claim 16. (withdrawn) An apparatus for non-contact laser capture microdissection from a visualized specimen, the apparatus comprising:

a support for supporting and viewing the visualized specimen;

a supporting substrate;

a selectively activatable layer maintained on the supporting substrate, the selectively activatable layer upon activation causes volumetric expansion with an extremity of the volumetric expansion exceeding a first interval taken substantially normal to a surface of the selectively activatable layer;

at least a first surface on the selectively activatable layer for contact with the visualized specimen;

apparatus interconnecting the supporting substrate and the support to maintain the selectively activatable layer overlying the specimen at a finite separation less than the first interval whereby upon activation of the selectively activatable layer the selectively activatable layer is brought into contact with the specimen

apparatus for selectively activating the selectively activatable substrate locally to cause the volumetric expansion.

Claim 17. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the apparatus interconnecting the supporting substrate and the support is independent of direct contact with the specimen.

Claim 18. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the selectively activatable layer maintained on the supporting substrate is activated by laser.

Claim 19. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

at least a first surface on the selectively activatable layer for contact with the visualized specimen when the selectively activatable layer is activated by laser.

Claim 20. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the supporting substrate and the selectively activatable layer are a tape.

Claim 21. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the supporting substrate is a tape and the selectively activatable layer is a coating on the tape.

Claim 22. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the first interval is in the range of 5 to 20 microns.

Claim 23. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the apparatus interconnecting the supporting substrate and the support to maintain the first surface at a spatial separation from all parts of the visualized specimen includes an air bearing.

Claim 24. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the supporting substrate is a convex member.

Claim 25. (withdrawn) An apparatus for non-contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the supporting substrate is a conical member;

the apparatus interconnecting the supporting substrate and the support to maintain the first surface at a spatial separation from all parts of the visualized specimen includes a rim on a conical member;

a support for the conical member remote from the specimen; and,

the selectively activatable surface constitutes a coating about the conical member.

Claim 26. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the supporting substrate is a tape;

the apparatus interconnecting the supporting substrate and the support to maintain the first surface at a spatial separation from all parts of the visualized specimen includes an inert coating of the desired thickness surrounding the active activatable surface on the tape; and,

the selectively activatable surface constitutes a coating on the tape recessed between from the inert coating.

Claim 27. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 26, the apparatus comprising:

the inert coating on the tape are on opposite sides of a circle about the selectively activatable surface.

Claim 28. (withdrawn) An apparatus for non contact microdissection from a visualized specimen according to claim 16, the apparatus comprising:

the selectively activatable surface maintained on the supporting substrate covered by a removable coating, the removable coating having a thickness to define a desired spatial separation between the selectively activatable surface and the specimen whereby upon removal of the removable coating, the selectively activatable coating has the desired spatial separation from the specimen.

Claim 29. (withdrawn) A method for manufacturing a prepared surface for non contact microdissection from a visualized specimen, the method comprising the steps of:

providing a supporting substrate;

placing a selectively activatable surface on the supporting substrate, the selectively activatable surface upon activation expanding over an interval into contact with the visualized specimen for contact with the visualized specimen;

providing at least a first portion on the supporting substrate for contacting a visualized specimen;

providing at least a second portion on the supporting substrate removed from and supported relative to the first portion on the supporting substrate to maintain the selectively activatable surface at the interval in juxtaposition with respect to the visualized specimen.

Claim 30. (withdrawn) A method for manufacturing a prepared surface for non contact microdissection from a visualized specimen according to claim 29, the method comprising the further steps of:

the provided supporting substrate is a conical member;

placing a selectively activatable surface on the supporting substrate includes placing the selectively activatable surface on the conical member;

providing at least a second portion on the supporting substrate removed from and supported relative to the first portion on the supporting substrate to maintain the selectively activatable surface at the interval in juxtaposition with respect to the visualized specimen includes placing a rim on a conical member.

Claim 31. (withdrawn) A method for manufacturing a prepared surface for non contact microdissection from a visualized specimen according to claim 29, the method comprising the further steps of:

the provided supporting substrate is a tape;

the placing of the first portion on the supporting substrate is a first ridge on the tape and a second ridge spaced apart from the first ridge on the tape; and,

the placing of the selectively activatable surface constitutes a coating on the tape recessed between the first ridge and the second ridge on the tape.

Claim 32. (withdrawn) A method for manufacturing a prepared surface for non contact microdissection from a visualized specimen according to claim 31, the method comprising the further steps of:

placing the first and second ridges on the tape includes placing the ridges on opposite sides of a circle about the selectively activatable surface.

Claim 33. (withdrawn) A method for manufacturing a prepared surface for non contact microdissection from a visualized specimen according to claim 29, the method comprising the further steps of:

placing a removable coating over at least the selectively activatable surface, the removable coating having a thickness to define a desired spatial separation between the selectively activatable surface and the visualized specimen whereby upon removal of the removable coating, the selectively activatable coating has the desired spatial separation from the visualized specimen.

Claim 34. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen, the method comprising the steps of:

providing a support for supporting and viewing the visualized specimen;
providing a supporting substrate;
placing a selectively activatable layer on the supporting substrate, which upon activation causes volumetric expansion with an extremity of the volumetric expansion exceeding a first interval taken substantially normal to a surface of the selectively activatable layer;
interconnecting the supporting substrate and the support to maintain the first surface at a spatial separation from all parts of the visualized specimen in juxtaposition with respect to the visualized specimen at the first interval of spatial separation from the visualized specimen; and,
locally activating the selectively activatable layer to bring the first surface into contact with the visualized specimen.

Claim 35. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 34, the method comprising the steps of:

the selectively activatable layer on the supporting substrate has a large volumetric expansion associated with activation.

Claim 36. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 34, the method comprising the steps of:

activating the selectively activatable layer to bring the first surface into contact with the visualized specimen includes thermoplastic injection of polymer into voids of the tissue sample.

Claim 37. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 34, the method comprising the steps of:

placing at least a first surface on the selectively activatable layer for contact with the visualized specimen includes providing the first surface with specific tethers for linking to specific cells in the sample.

Claim 38. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 34, the method comprising the steps of:

placing at least a first surface on the selectively activatable layer for contact with the visualized specimen with a monolayer coating on the surface with high affinity specific bonds for target cells on the visualized specimen.

Claim 39. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 34, the method comprising the steps of:

placing a selectively activatable layer on the supporting substrate includes placing material having a linear thermal expansion coefficient.

Claim 40. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 34, the method comprising the steps of:

placing a selectively activatable layer on the supporting substrate includes a material confining local expansion to an internally confined zone on all sides excepting the visualized specimen.

Claim 41. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 34, the method comprising the steps of:

placing a selectively activatable layer on the supporting substrate includes enclosing at least one air bubble within the selectively activatable layer.

Claim 42. (withdrawn) A method of laser capture microdissection from a specimen according to claim 34, the method comprising the steps of:

pretreatment of the sample surface with solutions containing element with a specific surface affinity to desired targets as well as a specific surface affinity to the selectively activatable layer.

Claim 43. (withdrawn) A method of laser capture microdissection from a specimen according to claim 42, the method comprising the steps of:

the pretreatment includes labeling with polymer microspheres (e.g., polystyrene latex spheres) attached to specific affinity tethers which recognize specific target molecules on the surface of the sample elements desired to be captured.

Claim 44. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen, the method comprising the steps of:

providing a support for supporting and viewing the visualized specimen;

providing a supporting substrate;

placing a selectively activatable layer on the supporting substrate, which upon activation causes volumetric expansion with an extremity of the volumetric expansion exceeding a first interval taken substantially normal to a surface of the selectively activatable layer;

interconnecting the supporting substrate and the support to maintain the first surface at a spatial separation from all parts of the visualized specimen in juxtaposition with respect to the visualized specimen at the first interval of spatial separation from the visualized specimen;

locally activating the selectively activatable layer to bring the first surface into contact with the visualized specimen at pedestal of material to adhere to the selected portion of the specimen;

separating the selectively activatable layer to microdissect the selected portion of the specimen; and,

after the separating step, locally activating the selectively activatable layer to cause any pedestal protruding from the activatable layer to retract.

Claim 45. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 44, the method comprising:
utilizing a broader beam of radiation after the separating step to locally activate the selectively activatable layer to cause any pedestal protruding from the activatable layer to retract.

Claim 46. (withdrawn) A method for non-contact laser capture microdissection from a visualized specimen according to claim 44, the method comprising:
utilizing a lower power beam of radiation after the separating step to locally activate the selectively activatable layer to cause any pedestal protruding from the activatable layer to retract.